Remarks:

Reconsideration of the application is requested.

Claims 1-12 are now in the application. Claims 1, 5, and 7 have been amended. Claim 12 has been added.

In item 1 on page 2 of the above-identified Office action, claims 7-11 have been objected to. The Examiner has stated that first adders should be first adder.

Applicants appreciate the indication of the informality and it has been corrected.

In item 3 on page 2 of the Office action, claims 1-6 have been rejected as being obvious over Krasner (6,289,041) in view of Shou et al. (5,974,038) under 35 U.S.C. § 103. Applicants respectfully traverse.

Claims 1 and 7 have been amended to relate to cellular CDMA radio receivers. For support, please refer to page 8, line 2, where the CDMA- standard UMTS is mentioned. Please also see page 2, lines 21 to 24. It is well known that UMTS is a standard for cellular phones.

The signal has been denoted as a synchronization signal, because a signal transmitted via a synchronization channel is a synchronization signal.

Support for the additional feature (determining the frequency deviation between the first and second frequency) can be found on page 16, lines 15, 16 in combination with the definition of f' on page 16, line 9, and the definition of $\Delta\varphi$ on page 4, lines 24 to 25.

Applicants would like to explain the general concept of the invention in order to perhaps provide a better understanding thereof.

CDMA mobile radio systems use a specific channel for synchronization purposes, the so called (first) synchronization channel. In UMTS, this channel is known as PSCH (primary synchronization channel). The uniquely defined sequences of binary chips transmitted over this synchronization channel are used by mobile stations for (1) time synchronization ("estimating the unknown time period Td with the maximum signal level determined in the determining step"), and (2) an initial **coarse setting of the** frequency. Conventionally, the synchronization channel is not used for frequency fine tuning, i.e. for frequency correction purposes. This is explained on page 3, lines 2 to 7, of the application.

The invention resides in that the synchronization signal provided by the first synchronization channel is used for both purposes: on one hand, as known in the prior art, the unknown time period Td is estimated by a matched filter analysis. On the other hand, taking into account the time period Td estimated in the estimating step, the synchronization signal is despread, the frequency deviation is determined, and a frequency correction ("fine tuning the second frequency to the first frequency") is performed.

The advantage of carrying out both tasks (estimation of the unknown delay time Td and frequency correction) necessary for the detection (See page 5, lines 6 to 9), on the basis of the synchronization channel is that the acquisition process can be performed more rapidly.

Krasner (6,289,041) relates to a global positioning system CPS, whereas the invention defined by claim 1 relates to a cellular CDMA mobile radio system. Krasner proposes using the received GPS-signal both for estimating the time of arrival (See column 5, lines 23 to 25) and for determining and compensating the frequency deviation between the transmitted and the received CPS-signal (See column 5, lines 39 to 45). As correctly set out in the Office action, Krasner does not teach despreading the received GPS-signal with the known CPS

code and taking into account the time period estimated in the estimating step. Further, Krasner fails to disclose that the frequency deviation is determined on the basis of the despread signal.

Shou et al. (5,974,038) teach despreading a received signal in a cellular mobile CDMA receiver by taking into account the time period estimated in the estimating step (See column 6, lines 41 to 53). However, it is the data signal that is despread. Shou et al. fail to disclose the despreading of a synchronization signal and fail to disclose that the frequency deviation is determined on the basis of the despread synchronization signal.

Neither Krasner nor Shou et al. propose first utilizing a first synchronization channel for performing both the time synchronization and frequency fine tuning in a cellular mobile radio system. Thus, it is believed that claim 1 is patentable over these references.

With regard to added claim 12, the entire prior art fails to provide any teaching or suggestion for using the PSCH as stipulated in UMTS for frequency correction purposes. While support for the features in this claim cannot be explicitly found in the application, applicants believe that one of

ordinary skill in the art would inherently find support for this feature in the disclosure as a whole.

In item 5 on page 5 of the Office action, claims 7-11 have been rejected as being anticipated by Krasner (6,289,041) in under 35 U.S.C. § 102. Applicants respectfully traverse.

Claim 7 is patentable for the reasons specified above with regard to claim 1 and Krasner.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 1 or 7. Claims 1 and 7 are, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1 or 7, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-12 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, he is respectfully requested to telephone counsel so that, if possible, patentable language can be worked out.

If an extension of time for this paper is required, petition for extension is herewith made.

Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,

Mark P. Weichselbaum
Reg. No. 43,248

For Applicants

MPW:cgm

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Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, FL 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101

L&L-I0206

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Markus Doetsch et al.

Applic. No. : 10/047,001

Filed : January 16, 2002

Title : Method and Device for Sychronizing Mobile Radio Receivers in a Mobile Radio System

Examiner : Emmanuel Bayard

Group Art Unit : 2631

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claim 1 (amended). A method of synchronizing mobile CDMA radio receivers in a cellular CDMA mobile radio system, wherein a first synchronization channel with a first frequency is provided for transmitting a synchronization signal with a code that is known to the mobile radio receivers and to base stations of the mobile radio system, and wherein a transmission from a base station to a mobile radio receiver delays the synchronization signal by an unknown time period and the first frequency is shifted by the transmission to a second frequency, the method which comprises the following steps:

splitting [a] the received synchronization signal into a real part signal and an imaginary part signal;

sampling the real part signal and the imaginary part signal to form sampled signals;

digitally filtering each sampled signal to correlate the sampled signal to the known code and to form filtered signals;

squaring each filtered signal to form squared signals;

determining a maximum signal level from the squared signals;

estimating the unknown time period with the maximum signal level determined in the determining step;

despreading the received synchronization signal with the known code and taking into account the time period estimated in the estimating step; [and]

determining a frequency deviation between the first frequency and the second frequency based on the despread received synchronization signal; and

fine-tuning the second frequency to the first frequency.

Claim 5 (amended). The method according to claim 1, which comprises defining the code to be transmitted with the synchronization signal to have a sequence of 256 chips uniquely characterizing the first synchronization channel.

Claim 7 (amended). A device for synchronizing mobile CDMA radio receivers using the method according to claim 1 in a mobile radio system having a first synchronization channel for transmitting a synchronization signal with a code that is known to all the mobile radio receivers and to all base stations of the mobile radio system, comprising:

input signal processing units in a mobile radio receiver for processing [a] the received synchronization signal including a real part signal and an imaginary part signal;

said input signal processing units generating sampled values;

a plurality of delay circuits connected in series with said input signal processing units for receiving an input signal and outputting an output signal, said delay circuits receiving the sampled values and correlating the real part signal and the imaginary part signal with the known code;

multipliers connected to receive the input signal and the output signal of each delay circuit and multiplying a supplied signal with a coefficient;

a first adder [first adders] connected to receive an output signal from each said multiplier [and each], said first adder outputting a summed signal;

squaring elements each having an input connected to receive the summed signal from a respective said first adder and outputting a squared signal; and

a second adder connected to receive the squared signals from said squaring elements.